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SURVEY ON SMART SENSORS

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Abstract: *Internet of Things (IoT) applications whether for city infrastructures, factories, or wearable devices — use large arrays of sensors collecting data for transmission over the Internet to a central, cloud-based computing resource. Analytics software running on the cloud computers reduces the huge volumes of generated data into actionable information for users, and commands to actuators back out in the field.Sensors are one key factor in IoT success, but these are not conventional types that simply convert physical variables into electrical signals. They have needed to evolve into something more sophisticated to perform a technically and economically viable role within the IoT environment.This article reviews the IoT's expectations of its sensors.what must be done to achieve the large sensor array's characteristic of the IoT.The availability and wide range of application of low cost sensors have encouraged a demand for improved sensor performance Integrated sensors are being developed to meet the designer's need for simpler systems Smart sensors are becoming integral parts of systems performing functions that previously could not be performed.*

I. INTRODUCTION

This paper will discuss the definition of integrated sensors and smart sensors, review examples of these sensors and discuss what impact these features may have on future sensor design and utilization .Smart sensor may refer to smart transducer. A smart transducer is an analog or digital transducer or actuator combined with a processing unit and a communication interface.

As sensors and actuators become more complex they provide support for various modes of operation and interfacing. Some applications require additional fault-tolerance and distributed computing. Such high-level functionality can be achieved by adding an embedded microcontroller to the classical sensor/actuator, which increases the ability to cope with complexity at a fair price.

In the machine vision field, a single compact unit which combines the imaging functions and the complete image processing functions is often called a smart sensor.

II. INTERNET OF THINGS (IOT)

IoT is a notion where the internet amplifies its applications wherein sensors, devices and people are connected to each other and communicate with each other with limited or no human intervention . Here, the communication between

these entities is realized with the help of various communication protocols, thanks to the developments in the area of ICT . IoT offers a platter of objects, sensor(s) and network technologies that can be used with various permutations and combinations to fulfil the idea behind IoT, and that is M2M (Machine-to-Machine)

communication in remote places. IoT has now transformed the approach on how people deal with themselves and each other, hence making the process of remote communication accommodating and accessible The concept of IoT has shifted the approach from people-to people communication to things talking to each other or things talking to people . It is basically a platform of various similar or dissimilar objects with idiosyncratic identifiers, being used along with sensors, electronics, network connectivity, that aids these things/objects to accumulate and process data and further transfer this data, etc; making the scenario of device-to-device or people-to machine communication, come alive. It enables the devices and people to be connected to each other anytime, anywhere and everywhere . So, it becomes extremely important to study how the process of communication takes place in the IoT domain. Hence, this segment of the paper elaborates the building blocks or rather the various modules of IoT.

III. **Types Of Smart Sensors**

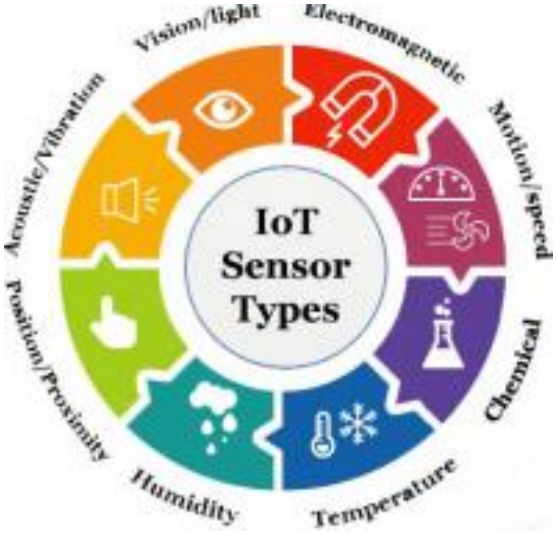

Figure :01

Electromagnetic sensors:

Electromagnetic sensors such as induction coils, hall sensors, giant magnetoresistance (GMR) sensors, anisotropic magnetoresistance (AMR) sensors, magnetoimpedance (MI) sensors, fluxgate sensors, optical magnetometers, atomic magnetometers, and superconducting quantum interference devices (SQUIDs), are being used A moving magnetic field causes an electric current to flow through conductive material. An electromagnetic sensor can be used to measure this induced electrical current..An EMF sensor detects the electromagnetic field produced by the current flowing through an electronic device. ... Current is passed through one coil, producing an electromagnetic field which, in turn, induces current in the second coil, and these currents are compared to each other.

A motion sensor:

A device used to sense all the kinetic and physical movement in the environment. An application for monitoring homes in the absence of homeowners can make use of motion sensors and whenever motion is detected the photos or videos can be uploaded on the server .A motion sensor is an electronic device that is designed to detect and measure movement. ... The most common type of active motion detector uses ultrasonic sensor technology; these motion sensors emit sound waves to detect the presence of objects.

Proximity Sensors :

The position of any nearby object can easily be detected with proximity sensors without any physical contact. By emitting electromagnetic radiation such as infrared, it finds the presence of an object by simply looking for any variation in the return signal. There are different types of proximity sensors like Inductive, Capacitive, Ultrasonic, Photoelectric, Magnetic and etc. targeting different applications. This particular type of sensor is mostly used in applications demanding security and efficiency. Various application areas of this type of sensors are object detection, counting number of items, measuring the amount of rotation, for positioning of objects, material detection, measuring movement direction, parking sensors.

Position Sensors :
The position sensor detects the presence of human or objects in a particular area by sensing their motion. It can be used in home security to enable the owner to track the doors and windows of rooms and appliances from anywhere. It lets them know the open or closed status at all times and can track the intruders in their absence. It can be used in healthcare monitoring for monitoring the position of patients, nurses and doctors in a hospital

Temperature sensors:
Temperature sensors are helpful in detecting the physical changes in one's body by measuring heat energy. Authors used temperature sensors for the monitoring of environmental conditions of the surroundings. The data collected is then sent to the cloud using Wi-Fi for the analysis. This is all done though android smartphone.

Acoustic and Vibration Sensor:

Acoustic and seismic vibration sensors to detect objects and/or events for area security in real time. To this end, we introduce a new environmental sensing based system for event triggering and action. In our system, we first design an appropriate hardware as a part of a multimedia surveillance sensor node and use proper classification technique to classify acoustic and vibration data that are collected by sensors in real-time. According to the type of acoustic data, our proposed system triggers a camera event as an action for detecting intruders (human or vehicle). Use of Acoustic and Vibration Sensor Data to Detect Objects in Surveillance Wireless Sensor Networks We use Mel Frequency Cepstral Coefficients (MFCC) feature extraction method for acoustic sounds and Support Vector Machines (SVM) as classification method for both acoustic and vibration data.

Chemical Sensors :
A chemical sensor is an analytical device used to measure the chemical composition of the environment. Air quality monitoring can be done using a wireless chemical sensor network by monitoring chemical plumes in the environment.

Humidity Sensors:
A humidity sensor measures air temperature as well as moisture and signals the humidity in the environment. Authors used humidity sensors for smart agriculture and enabled farmers to increase their overall yield and product quality by getting real-time live data of their land. A similar application is proposed by where the collected data is sent to the open source platform, Thingspeak.

IV.Functional Diagram of Smart Sensor

A Smart sensor senses measurand - physical quantity, property or Condition to be measured and Signal condition and storage unit has Analog to Digital converters which converts the signal into a digitally readable form and stores in its memory and further processes it like aggregating, error checking, etc., before sending to microprocessor or microcontroller.

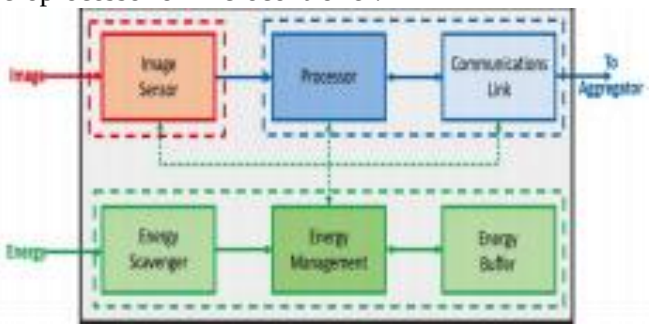

Figure:02

In the IoT system we have a need for ultra-low powered smart sensors along with energy efficient high performance cloud computing devices.The answer is smart sensors will need just enough performance to obtain the input from the sensors, process the signal and send the results to the communications system to be transmitted to the

aggregator.

V. APPLICATION

Industrial

In industries machines and equipment are monitored and controlled for pressure, temperature, humidity level, and also for vibrations. A Smart Sensor can monitor all these parameters at one go and also connects to the network without any other hardware assistance. This helps to maintain machinery and also ensure safety for employees handling the machinery.

Finger Recognition

A fingerprint sensor scans and captures a digital image of the fingerprint pattern. The image captured is called livescan. Using that live scan a biometric template will be created and stored for matching.

Pattern Recognition

When the sensor detects the contours of an object, it compares with them and also with models in a reference image.

Telecommunication

A smart card similar to SIM card, called a Wireless Identity Module (WIM), Using this card e-commerce transaction can be done with 100 percent security using encryption and digital signature.

Smart Dust

Smart dust is a hypothetical wireless network of tiny microelectromechanical (MEMS) sensors, robots, or devices, which can detect (for example) light, temperature, or vibration. The devices will eventually
be the size of a grain of sand, or even a dust particle, with each mote having self-contained sensing, computation, communication, and power.

Biomedical Applications

Many smart sensors for biomedical applications have also been developed by using chip technology .e.g. biochips Cyto-sensor micro-physio-meter: biological applications of silicon technology.

Smart roads

highways can be made smart highways or intelligent highways when timely warning messages and routes can be given according to climate conditions and unexpected events such as traffic congestion or accidents or catastrophic conditions

Real Time Application

Sensors are used in almost every area so as to create a smart IoT environment. Various researchers are working in the area of IoT sensors. In this section, we have presented some of the applications of IoT sensors.

VI.Conclusion

Internet of Things (IoT), plays an important key role by creating smart surroundings around us. Sensors play an important role in many Iot based applications by making smarter way to respond without any human intervention. This paper presents the various types of sensors used for a smart environment. It can be used in various fields such as health and monitoring, home appliances, agriculture etc. This paper analyze the various Iot based sensors used in various Iot applications.

References

I. B. C. Chifor, I. Bica, V. V. Patriciu, and F. Pop, “A security authorization scheme for smart home Internet of Things devices", Future Generation Computer Systems, Vol. 86, 2018, pp. 740-749.

II. O. Edewede, D. Jazani, and G. Epiphaniou, “Internet of Things Forensics: Challenges and approaches”, In: Proc. of 9th International Conference on Collaborative Computing: Networking, Applications and Worksharing (CollaborateCom), IEEE, 2013.

III. V. Mai and I. Khalil, “Design and implementation of a secure cloud based billing model for smart meters as an Internet of things using

homomorphic cryptography", Future Generation Computer Systems, Vol. 72, 2017, pp. 327–338.

IV. R.Y. Crist, "Amazon's Echo Show makes Alexa more accessible to the deaf and speech-impaired", 2018. Available Online: https://www.cnet.com/news/amazon-tap-to-alexa-accessibilityfeature/

V. M. Ambrosin, A. Anzanpour, M. Conti, T. Dargahi, S. R. Moosavi, A. M. Rahmani, and P. Liljeberg, "On the Feasibility of Attribute-Based Encryption on Internet of Things Devices", IEEE Micro, Vol. 36, No. 6, 2016, pp. 25–35.

VI. J.E. Fischer, A. Crabtree, T. Rodden, J.A. Colley, E. Costanza, M. O. Jewell and S.D. Ramchurn, "Just whack it on until it gets hot: Working with IoT Data in the Home". In: Proc. of the 2016 CHI Conference on Human Factors in Computing Systems, pp. 5933-5944, ACM, 2016.

VII.Stango, N. R. Prasad, and J. Sen, "Proposed Embedded Security Framework for Internet of Things (IoT)," In: Proc. of 2nd International Conference on Wireless Communication, Vehicular Technology, Information Theory and Aerospace & Electronic Systems Technology (Wireless VITAE), IEEE, 2011, pp. 1–5. Available Online: DOI: 10.1109/WIRELESSVITAE.2011.5940923

VIII P. Patil and V. Sachapara, "Providing Smart Agricultural Solutions/Techniques By Using Iot Based Toolkit," In: Proc. of International Conference on Trends in Electronics and Informatics ICEI 2017 Providing, 2017, pp. 327–331.

IX A. K. Saha et al., "IOT-Based Drone for Improvement of Crop Quality in Agricultural Field," IEEE Internet Things J., pp. 612–615, 2018.

X M. Ikhwan and N. M. Thamrin, "IoT Implementation for Indoor Vertical Farming Watering System", IEEE Internet Things J., pp. 89– 94, 2017.

XI S. Nazeem Basha, S. Jilani, and M. Arun, "An Intelligent Door System using Raspberry Pi and Amazon Web Services IoT", Int. J. Eng. Trends Technol., vol. 33, no. 2, p. 5381, 2016.

XII C. Occhiuzzi, C. Vallese, S. Amendola, S. Manzari, and G. Marrocco, "NIGHT-care: A passive RFID system for remote monitoring

XIII D. Zissis and D. Lekkas, "Addressing cloud computing security issues", Futur. Gener. Comput. Syst., vol. 28, no. 3, pp. 583–592, 2012.

XIV R. Chanchal, J. Chaman and Arif, W., "HEMAN : Health Monitoring and Nous", in IEEE WiSPNET 2017 conference., 2017, pp. 2115–2119.

XV S. Kale, M. Satendra, and P. Patil, "IOT based Wearable Biomedical Monitoring System", in International Conference on Trends in Electronics and Informatics ICEI 2017 IOT, 2017, pp. 971–976.